

installation
guide

hp StorageWorks auto path for AIX

product version: 04-02

seventh edition (september 2003)

part number: B7949-96005

This guide is a supplement to the HDLM product documentation and describes how to install and configure Auto Path for AIX with HP disk arrays.



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about this guide

This guide provides information about configuring the HP StorageWorks Auto Path for AIX product on supported HP disk arrays.

The Auto Path product requires Hitachi Dynamic Link Manager (HDLM) software. This guide is a supplement to the HDLM documentation. Before installing Auto Path, refer to the **readme** file for instructions and restrictions. The procedures described in this guide and the **readme** file supersede the instructions provided in the HDLM documentation. The GUI information in the HDLM documentation does not apply.

Intended audience

This guide is intended for use by system administrators who already have expertise with the associated systems and software and knowledge of related topics:

- data processing concepts
- direct-access storage device subsystems and their basic functions
- disk arrays and RAID technology
- operating system commands and utilities

Disk arrays

Unless otherwise noted, the term *disk array* refers to any of these disk arrays and appliances:

- HP StorageWorks Disk Array XP48
- HP StorageWorks Disk Array XP128
- HP Surestore Disk Array XP256
- HP StorageWorks Disk Array XP512
- HP StorageWorks Disk Array XP1024
- HP OpenView Continuous Access Storage Appliance (CASA)

Related documentation

HP provides the following related documentation:

- *HP StorageWorks Disk Array XP128: Owner's Guide*
- *HP StorageWorks Disk Array XP1024: Owner's Guide*

For information about operating system commands and third-party products, refer to the manufacturer's documentation:

- *Hitachi Dynamic Link Manager User's Guide*

Conventions

This guide uses the following text conventions.

Figure 1	Blue text represents a cross-reference. For the online version of this guide, the reference is linked to the target.
<u>www.hp.com</u>	Underlined, blue text represents a website on the Internet. For the online version of this guide, the reference is linked to the target.
literal	Bold text represents literal values that you type exactly as shown, as well as key and field names, menu items, buttons, file names, application names, and dialog box titles.
<i>variable</i>	Italics indicates that you must supply a value. Italics is also used for manual titles.
input/output	Monospace font denotes user input and system responses, such as output and messages.
<i>Example</i>	Denotes an example of input or output. The display shown in this guide may not match your configuration exactly.
[]	Indicates an optional parameter.
{ }	Indicates that you must specify at least one of the listed options.
	Separates alternatives in a list of options.



Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Getting help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website:

www.hp.com

HP technical support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support:

thenew.hp.com/country/us/eng/support.html

Be sure to have the following information available before calling:

- technical support registration number (if applicable)
- product serial numbers
- product model names and numbers
- applicable error messages
- operating system type and revision level
- detailed, specific questions

For continuous quality improvement, calls may be recorded or monitored.

HP storage website

The HP website has the latest information on this product, as well as the latest drivers. Select the appropriate product or solution from this website:

thenew.hp.com/country/us/eng/prodserv/storage.html

HP authorized reseller

For the name of your nearest HP authorized reseller, you can obtain information by telephone:

United States	1-800-345-1518
Canada	1-800-263-5868

elsewhere

See the HP website for locations and telephone numbers:
www.hp.com

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Installation



This chapter describes how to install HP StorageWorks Auto Path for AIX (Auto Path) on HP disk arrays.

Use these instructions instead of the procedures provided in the HDLM documentation.

Installing Auto Path in AIX environments

Before beginning installation, configure the AIX environment for Auto Path support and observe the following requirements.

- A license key is required before installation.
- After DLM devices have been created, use only **dln** commands for these devices. Do not use standard operating system commands. For example, use **/usr/DynamicLinkManager/bin/dlmmkvg** instead of **/usr/sbin/mkvg**.
- After a volume group is created on a DLM device, do not reference the underlying hdisk (as displayed with the **lsdev** command).
- Persistent reservation must be disabled when using Auto Path with a CASA.

All paths to the same LUN must have the same type of HBA with identical firmware.



Caution: If you combine different types of HBAs, HDLM may not be able to switch the path when an error occurs.

- The HDLM software cannot be used to manage the boot disk.
- Uninstall any previous version of Auto Path before installing the HDLM software.

Recommendation Use the same type of fibre switch for all paths.

System prerequisites for using the HDLM software

HP supports the following operating system environments:

- AIX 4.3.3 with a maintenance level of 09 or later; patch IY37841
- AIX 5.1 with a maintenance level of 02 or later; patches IY37437 and IY43734
- AIX 5.2 with patches IY39860 and IY44133

Use IBM FC6227 or FC6228 HBAs with current firmware installed.

Related information

See the HDLM documentation for other user information.

Disk array firmware and software dependencies

See the **readme** file on the Auto Path for AIX CD for firmware revision and software version requirements.

Installation procedure

Configure the disk array LUNs to be accessible to at least one port in each cluster of the array. That is one port in CL1 and the other in CL2.

Make the appropriate connections between the host HBAs and the disk array ports.

Configure host bus adaptors (HBA) and switches if used. See the HBA product documentation for the method and contents of settings. If Fibre Channel is connected, verify that the connection method (such as Fabric or AL) matches the settings.

Install VisualAge C++ (version 5.0.0.0 or later) filesets on the host if required. AIX 4.3.3 software may be obtained at:

<http://www-1.ibm.com/support/docview.wss?org=SW&doc=4001173>

For AIX 5.1 and AIX 5.2, the software is available on their respective install media.

To install Auto Path:

1. Log in with root authority.
2. Create the **/var/DLM** directory.
`# mkdir /var/DLM`
3. Create the **dml.lic_key** license key file.

Example `# echo "123456789ABCDEF" > /var/DLM/dml.lic_key`
 where the license key is 123456789ABCDEF.

If preferred, you can use **vi** to edit the file.

4. Insert the CD into the drive.
 There is no need to mount the CD.
5. Execute the install command.
`# installp -aXgd /dev/cd0 all`

Or in place of **/dev/cd0**, specify the special file of the installation medium.

Follow the display prompts to complete the install.

6. Verify that the package was installed.

```
# lspp -L AutoPath.rte
```

Verify that **AutoPath.rte** appears among the file set items in the output list and that its status is C (Commit). See the **readme** file on the Auto Path for AIX CD for the current level.

7. (Optional) Add the PATH environment variable to the execution environment.

*Bourne shell
or Korn shell*

```
# PATH=$PATH:/usr/DynamicLinkManager/bin
# export PATH
```

C shell

```
# set path=( $path /usr/DynamicLinkManager/bin )
```

If preferred, you can edit the **PATH** statement in the root **.profile**.

8. Define the physical volumes to be managed by Auto Path.

If you want to let the DLM driver recognize all volumes that can be managed by the DLM driver, this step is unnecessary. Continue with [step 9](#).

To limit the volumes to be managed, you may either specify the volumes to be managed or specify the volumes you do not want managed.

To specify the volumes to be managed, enter the logical names of these volumes (hdisks) in the configuration file:

```
/usr/DynamicLinkManager/drv/dlmfdrv.conf
```

Example

Enter all hdisk references for paths to the same LUN. If only volumes hdisk5 and hdisk7 are used for DLM and reference paths to the same LUN, **dlmfdrv.conf** will contain the following:

```
hdisk5
hdisk7
```

To specify the volumes to not be managed, enter the logical names of these volumes (hdisks) in the **unconf** file:

```
/usr/DynamicLinkManager/drv/dlmfdrv.unconf
```

Example

If physical volumes hdisk4 and hdisk6 are not to be recognized by the DLM driver, **dlmfdrv.unconf** will contain the following:

```
hdisk4
hdisk6
```

Note: If **dlnmfdrv.unconf** and **dlnmfdrv.conf** do not exist, the DLM configuration manager automatically creates the instances of the DLM devices for all of the disks supported by DLM.

9. Start the DLM configuration manager.

dlnmcfmgr

10. Verify that the DLM drivers (**dlnmfdrvn**) and alert driver (**dlnmadrv**) are installed on an active kernel and available.

Example

```
# lsdev -C | grep dlm
dlnmfdrv0    Available      HDLM Driver
dlnmadrv     Available      HDLM Alert Driver
. . .
dlnmfdrv1    Available      HDLM Driver
dlnmfdrvio   Available      HDLM Driver
```

In this example:

- **dlnmadrv** is the special file name of the DLM alert driver.
- **dlnmfdrvio** is the driver instance for internally managing Auto Path.
- **dlnmfdrv0** and **dlnmfdrv1** are the special file names of DLM drivers. Each driver instance represents all paths to the same LU. The DLM driver name does not relate to the hdisk or LU names. The instances start with **dlnmfdrv0** and increment sequentially.

Verify that all DLM drivers representing the disk array LUNs you want recognized are displayed. If one or more drivers are not displayed, AIX error information is in the **/var/DynamicLinkManager/log/dlnmcfmgr1.log** file. For details about the log file, see the AIX documentation.

11. Make sure a volume group is available.

If a volume group and file system already exists, see the HDLM documentation for conversion of the volume group to a DLM volume group then continue with [step 14](#).

If a volume group did not exist before you started installing Auto Path, continue with [step 12](#).

12. Create a volume group.

To specify a physical volume group, specify the DLM device representing the LU.

Example If hdisk4, hdisk5 and hdisk6 are in the same LU and represented by DLM device file dlmfdrv1:

```
# dlmmkvg -s 32 -y dlmvg01 dlmfdrv1
```

Recommendation Use a SMIT Window for volume operations. This window automatically display the physical volume that has the smallest physical volume number in the corresponding LU. For SMIT Window information see the HDLM documentation.

13. Create a file system.

Example To create a file system having the size 8192000 at the mount point **/tmp/dlmvg01_fs** for the dlmvg01 volume group:

```
# crfs -v jfs -g' dlmvg01' -a size='8192000'
-m'/tmp/dlmvg01_fs'
```

14. Free the mount point.

Example # umount /tmp/dlmvg01_fs

15. To make the volume groups available for Auto Path, deactivate and then activate the volume groups to be used.

Example # dlmvaryoffvg dlmvg01
dlmvaryonvg dlmvg01

16. Make the mount point available.

Example # mount /tmp/dlmvg01_fs

17. Verify the volume group.

```
# dlmsvg
```

18. Activate the DLM subsystem.

```
# dlmcfgmgr
```

A system reboot also activates the DLM subsystem.

19. Verify that the DLM subsystem is active.

```
# lssrc -a | grep DLMManager
```

Upgrading to version 04-02

Recommendation Before changes such as this are made to file systems, prepare a backup copy of data stored on the system.

Ensure that all 04-02 prerequisite conditions are met before proceeding with the upgrade.

All activity to the file systems must be halted for the duration of the upgrade.

Note: It is no longer necessary to uninstall the previous version of Auto Path.

To upgrade:

1. Unmount all DLM file systems.
2. Deactivate all DLM volume groups.

Example `# dlmvaryoffvg dlmvg01`

3. Save the **dlmfdrv.conf** or **dlmfdrv.unconf** file to a safe place.

Example `# cp /usr/DynamicLinkManager/drv/dlmfdrv.conf /tmp`

4. Remove the DLM devices created with the previous version.

dlmrmdev

5. Verify that no other software is using the Hitachi Network Objectplaza trace common library (HNTRLlib) then uninstall this library.

/opt/hitachi/HNTRLlib/etc/hntrsetup

When the HNTRLlib setup menu appears, Select 9.

6. Make sure the appropriate license key is in the `/var/DLM/dlm.lic_key` file.

Make a backup of this file. The version 04-02 installation will delete this file and the **/var/DLM** directory.

7. Insert the Auto Path 04-02 CD into the drive.

There is no need to mount the CD.

8. Execute the install command.

installp -aXgd /dev/cd0 all

Or in place of **/dev/cd0**, specify the special file of the installation medium.

Follow the display prompts to complete the install.

9. Verify that the package was installed.

lspp -L AutoPath.rte

Verify that **AutoPath.rte** appears among the file set items in the output list and that its status is C (Commit). See the **readme** file on the Auto Path for AIX CD for the current level.

10. Verify that the **dlnmfdrv.conf** or **dlnmfdrv.unconf** file is in the **/usr/DynamicLinkManager/drv** directory.

11. Activate the DLM subsystem.

dlnmcfmgr

A system reboot also activates the DLM subsystem.

The dlnmfdrv device files are regenerated as configured in the **dlnmfdrv.conf** or **dlnmfdrv.unconf** file.

12. Activate all of the DLM volume groups.

Example **# dlnmvaryonvg dlnmvg01**

13. Make the mount point available.

Example **# mount /tmp/dlnmvg01_fs**

Configuration and operation

2

This chapter provides supplementary information about Auto Path operation on HP disk arrays.

Setting the automatic failback feature using the `dlnkmgr` command

Use the **dlnkmgr** command to set up automatic failback.

dlnkmgr set -afb { on [-intvl *Interval_Time*] | off } [-s]

The **dlnkmgr** command sets whether automatic failback is used for failed paths. The default setting is **off**.

-afb	Specify whether or not the the automatic fail-back is used for failed paths.
on	Automatic failback of the failed paths is performed at a specified interval. The recovered path is returned online.
off	Automatic failback is not performed.
-intvl	Specify the time interval for automatic failback with a value between 1 and 1440 (minutes). When no value is set for this parameter, the value previously set or 1 minute (default) is used for failback processing. When automatic failback is newly turned on, or the DLM manager is activated, the first automatic failback is performed after the duration of the specified interval.

Settings on automatic failback remain valid after the system is turned off and restarted. The interval value is maintained even after the automatic failback is turned off. The stored value is used when automatic failback is set on again and no value is set for the interval at that time.

Only the paths containing an error are subject to the automatic failback operation.

The paths having an error when the DLM manager is activated are also included in the automatic failback operation.

With the addition of the auto failback, only normal paths are subject to health check.

Error indication on the last path

When the state of the paths is indicated with **dlnkmgr view -path** command, the last path for a device remains online. It does not go offline even if an error occurs. The path containing an error is now indicated as Online(E).

- The Online(E) path returns online if input and output can be successfully executed.

- The **dlmkmgr online** command or automatic failback returns the Online(E) path online only.

Using the **dlmkmgr online** command

If **-pathid** is not specified in the **dlmkmgr online** operation, all the paths in hold state are subject to online processing. If there is a path that cannot be recovered, the following message is output:

```
A path which failed to go online was detected during
online operation of the KAPL01039-W DLM command. Do
you want to continue the PathID = %d online
operation? [y/n]? Enter "y" to continue the
operation, or "n" to abort it.
```

When **-s** is specified, the operation is continued in an assumption that y is specified.

Executing the **dlmkmgr view -path** command can show the status of the LUN paths.

```
# dlmkmgr view -path
```

Identifying the DLM driver volumes

To view the hdisks that belong to a dlmfdrv device, execute the following command:

```
# dlmkmgr view -drv
```

Required commands for operating DLM volume groups

Auto Path cannot use devices that are recognized by AIX unless you take some special measures. This product provides utility commands for operating volume groups so that Auto Path running on AIX can recognize disks. A volume group created using the commands from DLM can be used only for Auto Path. The commands from the utility for operating DLM volume groups provided by this product correspond to the commands executed in the SMIT screen Volume Group.

Recommendation Use SMIT when you use the commands from the utility for operating DLM volume groups. When you use SMIT to select physical disks, SMIT displays only the first physical disk registered in ODM. This allows you to easily specify the physical disks allocated for the DLM of the same LU, all at one time.

Related information See the HDLM documentation for the commands to be used on DLM volume groups.

You can execute the commands from the utility for operating DLM volume groups from the command line or in the SMIT screen.

A volume group managed by Auto Path must contain only dlmfdrvXX. Do not include an hdisk definition in a DLM volume group.

The format of each utility command is the same as the format of the corresponding AIX command.

- Function

The utility commands operate the volume groups required for running Auto Path.

- Return values

The return values are the same as those of the corresponding AIX command.

- SMIT screen

A SMIT screen was added for executing the commands from the utility for operating DLM volume groups.

- Precautions

When you use a command from the utility for operating DLM volume groups to operate a volume group, specify the AIX name (for example, hdisk1) as the physical volume name. However, after you have operated the volume group, the volume name is changed to a Auto Path name (for example, dlmfdrv1).

The error messages and Help output for the commands from the utility for operating DLM volume groups are those defined for AIX commands.

To operate a volume group created using Auto Path, use the commands from the utility for operating DLM volume groups. If you operate a volume group without using the commands from the utility for operating DLM volume groups, the volume group may become invalid. In this case, use the AIX commands to rectify the volume group. (See the example.)

Do not specify any volume group other than a volume group created using the commands from the utility for operating DLM volume groups. Doing so may cause the volume group to become invalid.

Example Create a volume group for Auto Path:

```
# dlmmkvg -s 32 -y dlmvg1 dlmfdrv2 dlmfdrv3
# dlmldvg
```

Invalid volume group For a volume group used by Auto Path includes hdisk:

```
# dlmldvg -p dlmvg1
dlmvg1:
PV_NAME PV STATE TOTAL PPs FREE PPs FREE
DISTRIBUTION
dlmfdrv2 active 542 36 00..00..00..00..36
dlmfdrv3 active 542 36 00..00..00..00..36
hdisk4 active 542 36 00..00..00..00..36
```

See the HDLM documentation for commands to correct the condition, as well as the complete set of DLM commands.

